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Journal of the Society of Arts.

FRIDAY, FEBRUARY 22, 1867.

Announcements by the Council.

ORDINARY MEETINGS.

Wednesday Evenings at Eight o'Clock:—

FEBRUARY 27.—"On the Economy of Telegraphy as part of a Public System of Postal Communication." By EDWIN CHADWICK, Esq., C.B. On this evening SAMUEL R. GRAVES, Esq., M.P., will preside.

MARCH 6.—The following subject for Discussion will be introduced by Mr. CHRISTOPHER COOKE:—"On Storm Signals and Forecasts, their utility and public importance with respect to Navigation and Commerce."

CANTOR LECTURES.

The concluding Lecture of the course "On Pottery and Porcelain," illustrated by specimens of various manufactures, will be delivered by William Chaffers, Esq., as follows:—

LECTURE VI.—MONDAY, FEBRUARY 25.

ENGLISH POTTERY AND PORCELAIN.—Early History, continued to the beginning of the 19th century.

A Course of Lectures "On Music and Musical Instruments," by JOHN HULLAH, Esq., will be delivered as follows:—

LECTURE I.—MONDAY, MARCH 4.

HARMONY.—Introduction—Greek Music—Mediæval Musical Science—Acoustics—Musical Sound—Vibration—Pitch—Harmonies—Resultant Sounds—Consonance and Dissonance—Tonality.

LECTURE II.—MONDAY, MARCH 11.

MELODY.—Musical System—Tonality, Ancient and Modern—The Subdominant and Leading Note—Melodies in Imperfect Scales and in Ancient Modes.

LECTURE III.—MONDAY, MARCH 18.

MUSICAL EXPRESSION. — Definition — Difficulties of Musical Composition—Realization of Unheard Effects—The Perfect Cadence—The Renaissance—Imitation—Expression, False and True.

LECTURE IV.—MONDAY, MARCH 25.

MUSICAL NOTATION.—Different Systems, Alphabetical and Special—Neumas—Accents—Lines and Spaces—The Time Table—Modern Notation; its Origin and Growth, Simplicity and Fitness.

LECTURE V.—MONDAY, APRIL 1.

MUSICAL INSTRUMENTS.—Classification—Wind Instruments—Stringed Instruments—The Plectrum, Hammer, and Bow—Instruments of the Ancients—Mediæval Instruments; their Introduction into the Church.

LECTURE VI.—MONDAY, APRIL 8.

MUSICAL INSTRUMENTS (*continued*).—Modern Instruments—Chamber and Orchestral—Combination—The Modern Orchestra—Conclusion.

The lectures commence each evening at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend to each lecture.

ART-WORKMANSHIP COMPETITION.

The works sent in competition for these Prizes are now placed in the Society's Great Room for the inspection of members and their friends.

EXAMINATIONS, 1867.

In addition to the prizes announced in the Programme of Examinations, the following are offered:—

The Worshipful Company of Coach and Coach Harness Makers offer a prize of £3 in Freehand Drawing, and a prize of £2 in Practical Mechanics, to the candidates who, being employed in the coachmaking trade, obtain the highest number of marks, with a certificate, in those subjects respectively.

The Worshipful Company of Goldsmiths offer three prizes—of £5, £3, and £2 respectively—to the three candidates who, being employed on works in the precious metals in any part of the United Kingdom, shall obtain from the examiners the first, second, and next highest number of marks, such prizes to be distinguished as the "Goldsmiths' Company's Prizes."

INSTITUTIONS.

The following Institution has been received into Union since the last announcement:—

St. Thomas's (Woolwich) Evening Drawing Classes.

SUBSCRIPTIONS.

The Christmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

FOOD COMMITTEE.

The Sub-Committee on Meat met on Wednesday at 10.30. There were present—Mr. Benjamin Shaw (in the chair), Messrs. Harry Chester, Parish, C. S. Read, M.P., J. Ware, and E. Wilson. The meeting had before them a specimen of meat preserved in paraffine by Professor Redwood's process; two specimens of meat from Buenos Ayres, salted on Mr. Morgan's plan; specimens of Dr. Hassall's various preparations, flour of beef, meat cocoa, meat biscuits, &c.; *Extractum carnis* (Liebig) from South America, prepared by Liebig's Extract of Meat Company (Limited); from Australia, supplied by Messrs. Allen and Hanbury, Plough-court (Tooth's), Mr. Tindal, Mr. Hooper, Pall-mall, and also by Mr. Deane, of Clapham (two kinds), &c. The Committee proceeded to consider the best modes of testing, by experiments on a large scale, the nutritive value of certain articles, and resolved to proceed with that part of their subject at their next meeting on Wednesday, the 27th inst.

The Sub-Committee on Milk and Fish met at 12 o'clock on the same day. There were present—Lord de L'Isle and Dudley (in the chair), Mr. Harry Chester, Lord Robert Montagu, M.P., Messrs. J. C. Morton, and J. Ludford White. The Committee resolved to seek, from the principal railways entering London, information relative to the supply and transit of milk; and Lord de L'Isle and Dudley and Mr. J. C. Morton undertook to procure information as to the system of cow-keeping as practised in the North of England and in Scotland, with regard to the supply of milk to the labouring classes.

Cantor Lectures.

"On Pottery and Porcelain." By W. Chaffers, Esq.

Lecture V.—Monday, Feb. 11.

European Pottery.

The lecture was illustrated by a large collection of choice examples of porcelain, and a label was affixed to each, stating when the manufactory was established and when it was discontinued, and diagrams of the marks were placed upon the wall. The lecturer commenced by explaining the properties of the porcelain of Europe, and the difference between the *pâte tendre* and *pâte dure*, or hard and soft paste, and the peculiar methods of painting upon the biscuit adopted by the artists. The first successful attempt in Europe to imitate porcelain was made at Florence, as early as 1580, under the auspices of Francesco I. de Medici, but it was not so hard as that of China; that is to say, composed of kaolin and petuntse, but a soft paste and translucent, which is one of the principal tests of porcelain. For some reason, the manufacture of this porcelain was abandoned after the death of the inventor. This Medici porcelain is now very scarce; there are not more than 30 pieces known. The mark found underneath these pieces represents the Cathedral at Florence painted in blue. The manufactory of Doccia was founded in 1735, by the Marquis Carlo Ginori, contemporaneously with the Imperial manufactory at Sèvres. About 1760 it rose to great importance, and large groups were executed from the models of the most celebrated sculptors. In 1821 the moulds of the Capo di Monte porcelain were transferred to Doccia. Venice was celebrated about the same time (1730) for porcelain, *soft paste*. There is in many of the pieces a great similarity between the decoration of Venice and Chelsea porcelain, and it has been supposed that workmen from Venice were employed at Chelsea; moreover, the mark of an anchor has been adopted by both. The manufactory at Madrid called "La Chine" was founded by Charles III. in the garden of his palace, called *El buen retiro*. It was organized by workmen he brought with him from Capo di Monte, and there is consequently a great resemblance between the products of the two fabriques, both being soft paste; the landscapes painted upon this ware are very artistic. The celebrated porcelain manufactory at Dresden, or rather at Meissen (in its vicinity), was established by Augustus II., Elector of Saxony, for the manufacture of true porcelain, that is, hard paste. The experiments of Tschirnhaus and Böttcher commenced about 1706, and to the latter is attributed the invention of hard paste. His first attempt was a red ware, like jasper, which was cut and polished by the lapidary, and ornamented by gilding; it was a fine stoneware, having the opacity, grain, and toughness of pottery. In 1708 Tschirnhaus died, and, shortly after, Böttcher succeeded in discovering the mode of making true porcelain by the accidental detection of the kaolin necessary for the purpose. Böttcher was born at Schleiz, in Vogtland, in 1682, and died in 1719, at the early age of 37. He was sent by his father to Berlin to study alchemy, and was considered a great adept in this occult science, and was even supposed to have discovered the secret of the philosopher's stone. After remaining some time in the service of William 1. of Prussia, he became annoyed at the insupportable surveillance to which he was subjected, and fled; but he was arrested in Saxony, and the Elector detained him as a state prisoner; partaking of the credulity of the age as to the possibility of discovering the philosopher's stone, he resolved to test the powers of Böttcher, and sent him to the fortress of Königstein; subsequently he was removed to the Castle of Albretchtsberg, at Dresden. While there he continued his experiments, not altogether in the attempt to make gold, but in discovering the means of making true porcelain, and was, by a fortunate chance, enabled to discover the secret. The story is thus told:—John Schnorr, a rich iron-master of the Erzegebirge, in the year 1711, riding on horseback at Aue, near Schneberg, observed that his horse's feet stuck continually into a soft white clay, which impeded his progress. Hair-powder for wigs (made principally from wheat flour) was at that time in general use, and a careful examination of this earth suggested to Schnorr the substitution of it for the more expensive material, which was sold in large quantities at a cheap rate in Dresden, Leipsic, and other cities. Böttcher, among others, used it, but, finding it much heavier, desired to ascertain the deleterious ingredients, and analysed it, when, to his great astonishment, this ingenious chemist found in it the identical properties of the kaolin, which was the only thing required to complete his discovery of true porcelain. It was known in commerce as Schnorr's white earth of Aue, and was used secretly at the manufactory until the Aue kaolin was exhausted in 1850. In consequence of this important discovery, Augustus II. established the great manufactory at Meissen, of which Böttcher was appointed director in 1710, and about 1715 he succeeded in making a fine and perfect white porcelain. The first attempts to paint upon this ware were very imperfect, consisting of a blue colour under the glaze, in imitation of Nankin blue porcelain. It was under Horoldt's direction, in 1720, that paintings of a superior character, accompanied by gilding, and medallions of Chinese figures were introduced, and magnificent services completed. In 1731, Kändler, a sculptor, superintended the modelling of animals and groups, vases, &c., and other artists painted birds, insects, and copies of paintings principally of the Flemish school. From 1731 to 1756 the best productions emanated from the Dresden manufactory. Kändler modelled men and animals of the natural size, as well as peacocks, herons, pelicans, and other birds. Among the pieces produced about this time, by or under the direction of Kändler, at Meissen, was "The Tailor of Count Bruhl," mounted upon a goat, with all the implements of his trade about him. This vain man had a great desire that his likeness should be executed in porcelain at the royal manufactory, and his request was complied with, but not probably so as to gratify his vanity, for not only the tailor but his wife were thus immortalised, *aere perennius*, in porcelain. In 1754 Dietrich became director, and he was succeeded in 1796 by Marcolini, whose beautiful productions are well known. His period is always known by a star underneath the crossed swords. In spite of the precautions taken at Meissen to prevent the secret becoming known—the penalty being death, or perpetual imprisonment in the Castle of Königstein—some workmen escaped to reveal it elsewhere. Among these, a clever potter, named Stölzel, and a painter and gilder, Christopher Conrad Hünger, went to Vienna, in 1717, and were engaged by Claude du Pasquier, who obtained a privilege for 25 years. In 1744 it was purchased by Maria Theresa, and this was the period of its greatest prosperity. In 1785 there were 35 furnaces, employing more than 500 persons. This latter period is remarkable for the application in relief of solid gold platines exquisitely figured, and historical subjects, flowers, &c., finely painted. The mark used from 1744 to the present time is a shield of the arms of Austria. At a later period, 1751, William Gaspar Wegeley established a manufactory of porcelain at Berlin. It was carried on for eight years, but never remunerated the originator, probably for want of the requisite funds, and he abandoned it in 1761, but Gottskowski, a celebrated banker, became the purchaser, and, aided by his capital, it was brought to a flourishing state. Two years after, Frederick the Great bought the works, and it became a royal manufactory. Not content with ruining the Dresden *fabrique*, he expatriated many of the best workmen and painters to assist his own manufactory at Berlin, and transported not only the clay, but a great portion of the collection. Independently of this, and the better to insure employment for his 500 workmen, he restricted the Jews resident in any part of his dominions from entering into the marriage state until each man had obtained a certificate that he had purchased porcelain to a given amount. Höchst was early in the field as a competitor with Meissen in the manufacture of hard porcelain. A potter, named Ringler, who had escaped from Vienna, assisted in its formation, with Gelz, a fayence maker of Frankfort. About 1740, under the Elector John Frederick Charles, Archbishop of Mayence, the factory rose to great importance; and under Melchior, a celebrated modeller, from 1760 to 1785, the statuettes produced ranked among the first in Germany. The manufactory of porcelain at Frankenthal was established in 1754, by Paul Hanüng, who, having discovered the secret of hard porcelain, offered it to the royal manufactory at Sèvres, but not agreeing as to the price, the offer was declined, and they commenced persecuting him—for in that year a decree forbade the making of translucent ware in France except at Sèvres—and Hanüng was compelled to go to Frankenthal, leaving his fayence manufactory at Strasbourg in charge of his sons. In 1761 it was purchased by the Elector Charles Theodore, and it attained great celebrity. The Nymphenburg manufactory, near Munich, was established by Ringler, about 1756, and became a royal establishment shortly after. On the death of Carl Theodore, the Frankenthal works were transferred to Nymphenberg, and are still carried on successfully. The manufactories of porcelain at Furstenberg, Kronenberg, Fulda, Thuringia, Holland, and Russia, were next described, and, in speaking of those of France, the lecturer said the most celebrated for its early productions is St. Cloud. The china was altogether different from that of Dresden, being of soft paste, was established in 1695, and it may be considered the parent of all the porcelain manufactories in France. In 1702 letters patent were granted to the family of Chicanneau, which in 1712 were renewed, and M. Trou having married Chicanneau's widow, it was carried on in his name. In 1722 Trou's sons obtained a further grant, which was renewed in 1742 for twenty years more. Thus, the manufactory at St. Cloud being in active operation for upwards of 40 years, its products are by no means rare. They are easily known by their peculiar creamy glaze, and are frequently of an overlapping leaf pattern, called the "quilted china of St. Cloud," or painted in blue with a sort of arabesque border. The history of the celebrated manufactory at Sèvres must be traced back to that of St. Cloud, which, we have seen, was founded as early as 1695. Here Louis XIV. accorded his patronage and favour by granting exclusive privileges. In 1735 the secret of the manufacture was carried, by some of the workmen, to Chantilly, and for a time continued there by the brothers Dubois. They left in a few years, taking with them their secret, and settled at Vincennes, where a laboratory was granted them, but after three years they were dismissed. In 1745 a sculptor, named Charles Adam, formed a company, and the scheme was approved of by the king, privileges being accorded them for thirty years, and a place granted for their works in the Chateau de Vincennes. In 1753 the privilege of Charles Adam was purchased by Eloy Brichard, and Louis the Fifteenth took a third share—hence it became a royal establishment. Madame de Pompadour greatly encouraged the ceramic art, and it arrived at great perfection. The buildings were found too small to meet the increasing demands for their beautiful productions, and in 1756 they removed to a large edifice at Sèvres, built expressly for the company. The Vincennes porcelain is now much esteemed; a favourite decoration was flowers and birds, on a beautiful *bleu de Roi* ground, and cupids painted in camaieu of a single colour. The mark at first was the double L, without any letter denoting the date, and after 1753 (when the dating commenced) the letters A B and C are found enclosed within the cipher, after which it merges into the Sèvres category. In 1760 the king became sole proprietor, and M. Boileau was appointed director. By a decree of council, made in this year, Sèvres had the exclusive privilege of making porcelain, plain or painted, gilt or ungilt, ornaments in relief, sculpture, flowers or figures. Certain *fabriques* which had already privileges granted them, were allowed to continue their works of white porcelain painted in blue, with Chinese patterns only; the employment of any other colour, especially gilding and making figures and flowers was strictly prohibited. Even the makers of fayence were prohibited using coloured grounds in medallions or otherwise, or gilding. About 1761 the secret of making hard porcelain was purchased of Pierre Antoine, the son and successor of Paul Hanüng, for an annuity of 3,000 livres (£120), and the manufacture of the *pâte tendre* being expensive, and liable to accidents in the furnace, it was deemed important to substitute hard paste. Although possessed of the secret they had not the means of producing it, being unable to procure the kaolin necessary, until accident led to the discovery of some quarries yielding it in abundance at St. Yrieix, near Limoges. In 1769, after Macquer had brought the ware to perfection, the manufacture was successfully established at Sèvres, and both descriptions of china continued to be made until 1804, when, Brogniart being director, soft paste was altogether discontinued, and declared to be "useless in art, of expensive manipulation, dangerous to the workmen, subject to great risk in the furnace, &c." In conclusion, the various porcelain manufactories of hard and soft paste in France were reviewed, and their peculiarities pointed out.

ELEVENTH ORDINARY MEETING.

Wednesday, February 20th, 1867; Lord ROBERT MONTAGU, M.P., in the chair.

The following candidates were proposed for election as members of the Society:—

Busbridge, Walter, 4, Chester-place, Plumstead, S.E.
Guise, Francis Edward, 2, Middle Temple-lane, E.C.
Ingall, Charles, Mellish's Wharf, Limehouse-end, Millwall, E.
Johnson, John Robert, 31, Red Lion-square, W.C.
Keating, Lorenzo, 231, New-cross-road, S.E.
Kernaghan, B., 70, Bishopsgate-street Within, E.C.
Oliver, Thomas, 66½, Northumberland-street, Newcastle-on-Tyne.

The following candidates were balloted for, and duly elected members of the Society:—

Hawley, J. P., C.E., Lambeth Water Works, Brixton-hill, S.
Hewitt, F. K., London Joint Stock Bank, 124, Chancery-lane, W.C.

Howse, Thomas, 19, St. Paul's Church-yard, E.C.
Schofield, William W., Buckley Hall, Rochdale.
Stirling, Sir Walter, Bart, 36, Portman-square, W.

The Paper read was—

THE WATER SUPPLY OF LONDON, AS IT AFFECTS THE INTERESTS OF CONSUMERS.

By THOMAS BEGGS, ESQ.

At the present time there are two questions engaging the attention of thoughtful and practical men, kindred in their nature, and together lying at the root of all sanitary improvement. The one is, how to bring an abundance of pure, soft water to our towns and populous villages; and the other, how to utilize the refuse. To the first of these my observations on this evening will apply. I do not presume to offer anything new upon a subject which has been so much discussed for the last twenty years. In fact, I believe that nothing new can be said upon it; but I indulge the hope that I may be able to place some of the facts and arguments which have been adduced in favour of a constant supply of water for London, in such a connexion as will, in some slight degree, assist the inquiry which is now before the recently-appointed Commission. I propose to treat the question from that point of view, regarding myself for the time being as a consumer of water.

It would be a waste of time to enlarge upon the gravity and importance of the subject. Recent events have again forced upon our attention the necessity of an improved water supply for the metropolis, but the statements as to the privations and sufferings of the poorer classes under the present imperfect system are only repetitions of those made by competent medical authorities before the Commission which made its report in 1844. So that for nearly a quarter of a century the condition of our people has been appealing against us. For that period no material change for the better has been made in their general condition. We are again awakened to the knowledge that there are in the metropolis entire districts almost shut off from the blessings and amenities of our civilisation, and only occasionally we obtain a glimpse of the destitute circumstances of the inhabitants when we are threatened by an epidemic. The habits, modes of subsistence, and the daily pursuits of these people, are as little known to our well-to-do classes as if they were the denizens of another hemisphere. When an invasion of cholera is threatened we are stirred into activity. Inquiries are hurriedly made, and we are startled at the presence of so much misery. Stimulated by the mingled feelings of pity and alarm, we organize committees, and make a liberal distribution of soup, blankets, and bread. We scatter our charities at the time with a profuse hand, and exhaust the resources at our command in measures of treatment. When the danger has passed away we relapse into our old habits of indifference. If the promises made in the hour of peril are remembered, we soon learn to dismiss them as troublesome, or find excuses for postponing or neglecting their fulfilment. We do not seem to profit by the reflection that, if all the means which are suddenly called into employment when an epidemic is at our doors, had been judiciously and leisurely employed in measures of prevention, we might very likely have escaped the visitation. It is always a serious evil to deal out large benefactions. They doubtless relieve the suffering of the moment, but they sow the seeds of future mischief, very often breaking down the independence of the labourer, and initiating his children into habits of vagrancy and mendicancy. We have other monitors besides those which reach us on the wings of the pestilence, and which admonish us as to the danger of permitting in our very midst the existence and growth of a large vicious and neglected class, who look upon the law as their enemy or oppressor, and upon the property of the industrious as their legitimate prey. Apart from all moral obligations, we have the strongest economical reasons for diminishing the numbers of the pauper and indigent classes, for they bring upon the community an inexorable tax, more heavy than any other tax levied for the maintenance of the state. Let us hope that the lesson lately taught to us will not be so utterly disregarded as many of those which have been taught to the nation in years gone by, and that we shall, in right good earnest, set about works of permanent and substantial improvement, amongst which stands in the foremost rank a constant supply of water.

In entering upon such an inquiry, it is necessary to guard against errors of inference, and especially against those exaggerated statements which obtain currency in periods of panic or excitement. As an example of such, I have seen comparisons made as to the mortality of different districts, ascribing the difference to the water supply. Nothing can be more fallacious than such comparisons. The higher death-rate in some districts over others is not due to one but to a variety of causes. If an abundant supply of pure water were given to the inhabitants of Bethnal-green, there would still be a higher mortality than in many of the West-end parishes, and this would arise from overcrowding and other causes known to prevail in densely-populated districts. A vitiated atmosphere is quite as potent an agent in the generation of disease as impure water. It is sufficient for our purpose that the supply of water to the metropolis is, under the present system, insufficient for all the reasonable requirements of the population. Without a good supply of water public and private cleanliness is impossible. Water in reasonable abundance is, in fact, essential to health, comfort, and decency. Under a scanty supply the poorer classes suffer the most, and they are the most helpless in preferring appeals for succour and redress. When we condemn them for slatternly and uncleanly habits, we ought in justice to compare their condition with our own. If a woman, the mother of a family, has to descend from an upper floor—from what is probably the living and sleeping room of herself, husband, and family—to a court-yard for all the water she has to use, the result will be great economy in the use of it, and that will soon affect all her other habits. This is unfortunately the condition of thousands in London, and under such circumstances it would be a marvel if the poorer classes were other than they are. We cannot say that they are placed in a fair position until a supply of water, sufficient for all reasonable purposes, is placed, if not in every room which forms a human habitation, at least on the floor of each house divided into separate tenements, so that the tenants may obtain water for domestic use without ascending or descending stairs to fetch it, or to convey away the water which has been used. I cannot but feel that there will be dereliction of duty on the part of every member of a vestry or district board, and indeed of every ratepayer, who allows this question to slumber, and who does not assist in the agitation for an improved water supply.

But there are other reasons for demanding an improved supply of water—namely, on the ground of its requirements for public purposes. I will take the case of fires. There is no place in the empire where it is of greater importance to possess an efficient machinery in the case of fires, and yet London is behind many second and third-rate towns in this respect. The increase in number of large edifices for public purposes, as well as of warehouses and manufactories, makes it imperative that the best mode of extinguishing fires should be adopted. In the metropolitan district there is an area of about 400 square miles, and there are nearly 500,000 houses. The increase of the value in property is even greater in proportion than the increase of population. The rateable value of property in 1862 was about £12,500,000; but in 1865 it had risen to £14,500,000. The total number of fires in 1866 was 1,338, of which 326 resulted in serious damage and 1,012 in slight damage. These figures show the importance of the question. The present system is this:—The fire brigade is under the management of a central office in Watling-street, and there are branch offices in all the principal parts of London. At all these branches a staff of men is ready night and day, and an engine can be despatched from any of these offices in less than five minutes. I believe the average time is two and a-half minutes. The discipline is excellent, and all the appointments are in the most perfect order. The communications from office to office are made by telegraph. It is a proof of the steadiness of the men, that although the engines proceed at a gallop, a stoppage or accident in the streets is very rare. When the engine arrives at the scene of the fire, one of the wooden plugs—the precise positions of which are indicated by tablets fixed on adjacent walls or buildings—is drawn from the main, and a portable cistern, made of flexible material, and which is carried on the engine, is filled from it and kept charged, and from this the pump of the engine is supplied so long as its services may be required. The expedition with which these engines are started, conveyed to their destination, and prepared for active work, is a matter of astonishment to all who witness the operation for the first time. The men employed in the management of the engines and the distributing apparatus, and, in fact, all concerned, display such cool intrepidity and disregard of personal danger as to win general admiration. They display, in fact, the same high qualities—the firmness, steadiness, and resolution—which have always distinguished our soldiers and sailors wherever duty called them to go. All has been done for this service that skill and discipline can accomplish, and the whole arrangement reflects the highest credit upon the late Mr. Braidwood, and his successor, Captain Shaw, under whom the brigade has been brought to its present state of efficiency.

There is, however, an inherent defect in the system for which the brigade service is in no way responsible. It is inevitable that a loss of time that is of the greatest possible conequence in cases of fire must ensue. In Manchester, a hose and jet can be attached to a fire-cock and the water brought to bear upon the fire in about the time that is required to start a fire-engine from one of the London stations, that is:—the connexion of a hose and jet to the fire-plug does not take on the average more than two minutes. The value of the fire-cock system is demonstrated at once. I have not been able to ascertain the average amount of time that elapses in London between the first discovery and the water being brought to bear on a fire, but if the average be taken at half-an-hour, which is certainly rather under than over, then that half-hour is clearly lost; and in that space of time the Surrey Theatre was burnt down. From the extent which the fire in that particular case had progressed, and the rapidity with which the flames spread, it may be presumed that no human exertion could have saved any portion of the interior had water been supplied at the moment of discovery; but this was an exceptional case, and there have been instances in London where if water could have been brought to bear with the promptitude that is practicable in the towns where a system of fire-cocks is adopted, the fire would not have left the apartment in which it originated; and yet the time required to bring the engine and fit it for use has been sufficient to give the flames such an ascendancy as to defeat all efforts to subdue them. The saving in time of the difference between two and a-half minutes and half-an-hour would be often sufficient to arrest a fire that ends in a total wreck. There is a period in the history of every fire when a bucket of water properly applied would extinguish it, and every moment is of the utmost value. It perhaps cannot be made matter of accurate calculation, but I believe one-half of the property lost by fires in London might be saved if a system of fire-cocks were introduced. I believe that for the last twenty years no water works have been carried out in any part of the kingdom where fire-cocks have not been introduced as a part of the arrangements of supply. One of the best precautions is that of the proprietors of large establishments placing fire-cocks on their own premises. This arrangement is practicable, and is often carried out under the present system, but a constant supply would give greater facilities to private proprietors. There are other public purposes, the efficiency of which depend upon a constant supply of water, and on which space will not allow me to enter.

The superiority of a constant supply being acknowledged, the question will at once occur, why the Metropolis should not be supplied on a system that works so well in Nottingham, Norwich, or Wolverhampton. If it be applicable to a town of 50,000 inhabitants, why not to London with its 3,000,000. Mr. Bateman informs us that he has carried out the constant supply system in about 25 towns besides those in which he has been engaged as consulting engineer—towns with a population of from 7,000 to 600,000 persons, and a gross population of 2,000,000; and Mr. Hawksley, who was one of the first to carry out and enforce the advantages of a constant supply, has carried it out in about an equal number of places. Mr. Rawlinson has also carried it out in all the towns for which he was engineer. In all about 150 towns in Great Britain are enjoying the benefits of a constant water supply. Then why not London? It is said that a constant, which means an unlimited supply of water, could not be sustained from the excessive waste that would ensue, and that all the available resources at command would be exhausted under a waste going on night and day. This has been said in relation to every town, when a constant supply has been proposed. But I have partly answered that by showing the number of towns where the constant supply has been carried out, and it can be further answered by showing that the waste has been much less in the towns where a constant supply has been introduced than in those where an intermittent system prevails. In Nottingham, where Mr. Hawksley first introduced the system of constant supply, and where it is still retained, the consumption has been reduced to 14 gallons per head per day; and in Derby, under the same engineer, it is only 17 gallons. In Norwich I believe the quantity has been reduced to 12 gallons. Mr. Bateman informs us that the quantity used in the manufacturing towns of Yorkshire and Lancashire averages from 16 to 21 gallons per day. This is the general testimony, and the reduced consumption is easily explained. A constant supply necessitates the adoption of successful checks against waste and vigilant supervision, and I can see no reason why, with the same provisions, and under the same conditions, the consumption should not be reduced in London to the average of the manufacturing towns of Lancashire. If the difficulties are met with proper appliances and with determination, they will disappear as they have done in other cases. So far as quantity is concerned we have at present sufficient, if it be properly economised, to supply the requirements of London.

The subject is, however, generally argued as if the supply of London was insufficient in quantity and imperfect in quality. To remove these evils a number of schemes have been proposed, and upon each of them have been expended a large amount of time and no inconsiderable expense. Each of the schemes has its supporters, and the gentlemen who have prepared them are well able to expound and defend them. They propose to bring a supply of water sufficient to supersede all the present sources of supply; and these schemes come recommended to us as the proposals of men of high professional reputation. I will only name a few; and as my object is not to discuss the merits of any, I shall be pardoned for not naming all the schemes which, for the last twenty years, have been laid before the public. Mr. Homersham proposed to supply London from the neighbourhood of London itself, and a proposal was made for a company—the London Watford Spring-Water Company; and a Bill was prepared, and read for the first time in the House of Commons, on February 6, 1850.

Mr. Bateman proposes to supply us from a source 183 miles away—from the sources of the Severn. Messrs. Hemans and Hassard take us a still greater distance, and propose a supply from Ullswater, a distance of 240 miles away; and Mr. Bailey Denton proposes to obtain a sufficient supply from the Thames watershed. Whether any or none of the plans are adopted, the discussion which must ensue will be of immense advantage in bringing every phase of the question before the great body of consumers. I will only plead for each of these plans to this extent—that the consideration of none of them should be dismissed on the grounds of distance or expense. This plea often prevails when works of utility are before us, and which involve a heavy first cost, but a more unwise economy could not be practised. I will take the plan which appears to be the most expensive—that of Messrs. Hemans and Hassard; and I believe that every intelligent person who has given attention to the subject will admit, that if it can be shown that we have not at present a sufficient supply of water in London, and that a supply cannot be got at a less distance than the lakes in Cumberland—and that it can be got there in sufficient quantity and purity, then that the £25,000,000 which is the amount they ask for the completion of the works, would be a wise expenditure, and that the interest of the money will be less in amount than the annual loss arising from an imperfect system of water supply. There is no doubt that we shall exercise due caution before we commit ourselves to so serious an outlay, but the heavy cost ought not to be put in the balance against the health and comfort of the community.

Now what are the real difficulties in the way of carrying out a system of constant supply for London? It is not for want of plans, nor of engineering and mechanical skill—nor yet for the lack of enterprize among our people, nor assuredly for the dearth of capital. Then where is it? In entering upon it, I must say that the question has always, as it appears to me, been discussed with much unfairness towards the existing water companies. They are spoken of as huge monopolies, standing in the way of all improvements, and making large profits out of one of the first necessaries of life. I am almost ashamed to repeat some of the arguments which are in common use, but I am induced to do so, because reducing them to the simplest shape is really to answer them. It is objected by some that water is sent by a bountiful Providence, like air, in the greatest abundance, and that it should not be made an article of commerce, like coal or gas. They contend that the water costs nothing, and that it ought to be given to the people, under municipal arrangement, at a nominal price; and on the strength of such reasoning they would call upon the legislature to supersede the water companies, and establish some other machinery in their stead. In a commercial age, and among a commercial people, such arguments will weigh for nothing with those whose intelligence really influences and directs the legislation of the country, and the sooner they are dismissed from the minds of the consumers the better. The case of the water companies appears to be this—They were incorporated under a very different state of things to the present; when the style of living and ideas of comfort were altogether different; and when there were no municipalities having the disposition or the power to carry out any general schemes of water supply. If we go back even so far as the commencement of the present century, we must admit that the men who came forward to embark their capital upon works of public improvement were public benefactors, and the property they have created is entitled to the protection which the state affords to all kinds of accumulated corporate property. As to the profits made by the companies, they are not large, and scarcely such as would satisfy a large capitalist in any large undertaking. The weakest of all arguments is that which is founded upon the abundance and first cost of the article. The water companies charge for the water, it is true, but the charge has to cover the cost of bringing the water from a distant source, where it is really of no commercial value, into the homes of the London public. The water-rate in fact covers the cost of whatever arrangements the companies may enter into to secure the original supplies, the canals by which it is brought into the field of consumption, the filtration, the pumping, the laying of large mains and service mains, the formation of reservoirs, and all other parts of the machinery of construction and maintenance. If for a moment we cease to call them water companies, and look upon them as water carriers, we shall then see more clearly what the revenues they receive have to cover. A gallon of water weighs ten pounds, so that a family of five persons, according to the average London consumption, which we may take at thirty-two gallons per head, have brought into the house, if the internal arrangements of the house are in perfect order, without any trouble, either as to the conveyance or as to the delivery, 1,600 lbs., or nearly three-quarters of a ton, or 320 lbs. weight for each person daily. It may be instructive to give a few simple calculations, so as to bring the matter more clearly to the mind. The 108,000,000 gallons brought into London daily would fill a lake 3,000 feet long, 200 feet broad, and 30 feet deep; or we will take it in another shape—it would fill a canal 10 miles long, 35 feet broad, and 10 feet deep. The total weight would be nearly 500,000 tons.

As to the quality of the water, I do not wish to enter upon that inquiry, as the question can only be settled by scientific investigation, but I believe that an injustice is done to the London companies, by the condemnation of the water supplied by them, and in this way:—The water submitted to test has been, in many instances, taken from the service cocks after leaving a cistern, and assumed to be in the state in which it left the mains. If the water that is subjected to analysis be taken from the mains, then I think that it will bear a comparison with the water that is supplied to many towns where the constant supply system prevails. I have detected gross impurities in the water at hotels in Manchester, but the supply from the service might be pure for all that. Much of the impurity of the London water is attributable to the state of the cisterns and other receptacles for storage in common use. Many of the cisterns are old tubs and barrels, unfit for the purpose, to begin with, and rendered foul by long use without cleansing of any kind. Many of them are so fixed that they receive the drainage from roofs of outhouses, the rain water, and percolations from defective walls and gutters. Many of these, of a better construction, have an overflow pipe running into the soil-pipe of the water-closet. They are so placed in the majority of cases as to receive the emanations floating in the atmosphere. It is one thing to take water from one of these receptacles, and quite another to take it from a properly-constructed slate cistern, carefully protected from the admission of foul and deleterious matter from without. It is a powerful argument in favour of a constant supply, that it would necessitate a thorough revision of all the cisternage of London, and the removal of all cisterns which are unsuited to the purpose. While the present system continues it is not fair to blame the water companies for those defective arrangements, over which they have no control. I say this in fairness to the water companies. But I say, further, that if they are not able to give a constant supply, then it is clear that they must stand out of the way, and leave it to others to undertake the work; but if, as I believe, they have both the will and the ability, then it is incumbent upon us to consider how far the interests of the general public would be served by superseding them, and creating in their place some new and centralised authority. Of late years the London companies have given much attention to the subject of constant supply, and are now making diligent inquiries on the whole question. In many cases the companies are giving a constant supply, where satisfactory arrangements are made to guard against waste; and the language they employ is this:—"We will undertake to give a constant supply, to meet all the legitimate wants of London—if we can find security against ruinous waste."

I think the companies exaggerate this difficulty; but it is one of great magnitude, and one that must be carefully considered. There are facts enough to create dismay if they are looked at without the light that is thrown upon them by the experience of the provinces. I observe, in all the valuable papers that have been contributed on this subject, that a deficiency of quantity for the supply of London is in all cases assumed, and the present quantity is taken as the basis of all calculations of supply for the future. Now what are the facts? The quantity consumed in London is, as I have said, 108,000,000 gallons per day, which gives an average of 231 gallons per day to every one of the 470,000 houses supplied, and for its 3,000,000 of population 36 gallons per head for every man, woman, and child, or something more than double what is delivered under the constant supply system in many of our large manufacturing towns. Of this immense consumption it may be safely said that two-thirds are wasted, but if we take it at one-half, if we could reduce the consumption, by saving the waste, to 18 gallons a day per head, then we shall have an available daily surplus supply of 54,000,000 gallons to meet the wants of an increasing population, and the demand of those luxurious habits which always grow with the means of their gratification. I have been surprised that this view of the case has been so much overlooked. The poorer classes are not deprived of a sufficient quantity of water because there is not enough in our present resources, but because the whole of the community makes an improper use of that which it obtains. Their privations arise not from deficiency of quantity, but from waste. As I have said, I cannot see why the London public should use more than the public of Manchester, if proper precautions were taken against waste. Carelessness in the use of resources leads in this case, as in most others, to profusion, and the homely adage is verified that wilful waste makes woeful want. The worst of it is that the careful and the prudent have to suffer from the carelessness of the improvident.

This is the vital question—the one which includes the other questions involved in a water supply for London—and we shall be all the better for looking at it boldly. In London it is well-known that the negligence and dishonesty as to water fittings are most flagrant. For the sake of a copper ball or a brass service-cock, which may be sold for a few pence, they will be torn from their places, the other parts of the service seriously damaged, so that the water runs to waste, and so continues for days until detected by an officer of the company. An intelligent audience would scarcely give credit to a report, if such could be made, as to the extent of mischief of this kind. This is one cause of waste, but the greater cause of waste is the negligence of all classes of the population, and by no means the vice of the poorer classes alone. No value seems to be attached to water, and the utmost recklessness prevails. I have known instances, in towns where the constant supply system exists, of respectable persons, on the mere suspicion that a foul smell came up through the outlet of a wash basin, turn a tap and leave it on all night; and no doubt it was an aggregation of acts of culpable recklessness like this which created apprehensions in Mr. Bateman's mind as to the Glasgow Water Works, and induced him to represent to the corporation of that city, that if the consumption continued, which at one time had reached 47 gallons per head, the resources of Loch Katrine would fail to meet it. Nothing is more common than to find a stream of water running from a broken or defective ball-cock, or a service cock of a bad construction, or which is out of repair; that one cock wasting in the twenty-four hours more than is due to the fair consumption of a family. Very few persons have any idea of the amount of water that may be wasted in this way, serving no useful purpose whatever. I will illustrate this by giving the results of actual experiments made by two independent persons besides myself. In each case a leaky cock was taken, when dropping only—such a cock as is usually placed over sinks—and it was found that such a dropping would consume half a gallon per hour, or twelve gallons per day, a larger quantity than is due to any adult person who does not use a bath. By dropping I mean such a series of drops as would not make a continuous stream.

This waste can be largely reduced by vigilant supervision and the introduction of superior mechanical water-waste contrivances. The habits of the poorer classes do not present an insuperable difficulty, for those habits may be overcome. The poorer classes are most unfairly used, and then the evils which arise from neglect are urged as reasons why no effort should be made to remove them. Look at the habitations into which the poorer classes are crowded, and the fittings which are left for their use. Cleanly and orderly habits are impossible, and a constant deterioration is going on. The introduction of better appliances must precede the proper use of them, and, as in all other cases that I am acquainted with, they will learn how to use and respect such improved appliances when given to them. It is disgraceful to retain the butts and water-closets which at present exist; and I believe that it would be attended with beneficial results if the water rate was in every instance levied upon the landlord, making him responsible for all defects of construction, all mal-arrangements, and all waste. For a great number of years the manufacturing skill of this country has been engaged in perfecting contrivances for the prevention of waste; and I speak with the greatest possible confidence when I say that I believe a constant supply of water in London is perfectly practicable, and that it might be brought about with a much less consumption of water than that which is now consumed. Improvements in habits, and consequently in morals, have always followed improved dwellings and improved sanitary arrangements, and this is the great encouragement to perseverance in a good work.

The next important question before us is that which affects the administration of an improved water supply. In whose hands are the powers of a new Act of Parliament to be lodged? This question might be set at rest by the present companies undertaking to give a constant supply, and I believe that they would be supported in any application made by them for extended powers to enforce restrictions upon waste. Their interests in this particular are identical with those of the consumers. They desire to prevent waste, as that diminishes their supply, and reduces the pressure, and produces irregularity and confusion in all their arrangements; and they desire also to get paid for all that is supplied. The consumers are interested in the prevention of waste, as they have to pay for that which is wasted as well as for that which is used. There ought really to be no antagonism between the supplier and the consumer of the water. If the companies find insuperable difficulties in providing for constant supply, then I think that the public will not be content with things as they are, and that Parliament will be called upon to pass some enactment that will enforce what is demanded; and then, as I have asked, in whose hands are the powers of administration to be lodged?

As it is impossible that in a matter of water supply there can be competition, the alternatives are very few. Competition has been tried, and the evils were found to be so great, arising from two different companies laying mains over the same district, and often in the same street, that neither Parliament nor the public would listen to any proposal to resume so objectionable a principle. Then there are three courses open to us:—The first, which finds favour in many quarters, is that of appointing a commission to govern the water supply; the second, is that of placing the government of such supply in the hands of the Metropolitan Board, or whatever other central Board may be appointed under a new system of local government for the metropolis; and, the third, is that of leaving the water supply in the hands of the present companies, enforcing a constant supply, but giving them further powers to make provision against waste, and substituting another and a fairer principle of rating for that which is adopted at present. All these proposals I intend briefly to notice.

Those who support the supply of water being placed under the government of a commission, invariably take us to Paris, as an instance of what central authority can effect. I am willing to admit, having examined the system adopted in that city, that in some respects their arrangements work better than our own. In relation to their provision as to fires, they have in all their large buildings a preventive service; and such fires as those which ended in the destruction of the Covent Garden and Surrey Theatres, could not have occurred in any of the Paris theatres without the most criminal neglect. They provide, in fact, for each theatre a small fire brigade, of three or five men, as the circumstances of the case may require, whose duty it is to keep a vigilant watch night and day, to remove all rubbish and waste, and everything of a combustible character, to look after the gas, and. especially during the hours of performance, to keep watch upon the machinery and stage effects. These men have dormitories in the theatre, in which are fixed a number of alarums, so that in case of fire at any hour, they are advised by the men on watch as to the part of the theatre where their services may be required. They have wet blankets, mops, and all other apparatus provided and ready. At a moment's notice they can have water ready to pour upon the fire under pressure, by means of a cistern made on the principle known as that of the Hiero's Fountain. The whole arrangements are complete, and the discipline unexceptionable, and may be studied with the greatest possible advantage by the London community. In other respects, as to watering and cleansing roads, the plans in operation in Paris might be adopted in some of the suburbs, if not in the busy parts of London with advantage; and there is a profusion of water for all purposes of public display and luxury; but when we go among the homes of the people, we find all the defects so glaringly exhibited amongst our own population. Thousands of the Parisian population have no resource but a temporary stand-pipe, which is fixed for a short time in the morning of each day in the streets. The quantity of water supplied to Paris is about 50,000,000 gallons per day, so that the population being little more than half that of London, the number of gallons to each person is about the same in each case. The waste, as in the case of London, is enormous. I have myself seen from defective stand pipes and valves an amount of water running to waste in the streets of Paris sufficient for the supply of a whole district. Under the chief engineer, M. Belgrand, great improvements have been effected, and the citizens of Paris are largely indebted to his energy, skill, and perseverance. Commercially, however, I regard the system as a failure. It has under the present government acted upon the generous principle of providing water for the poor gratis, and the expenses are paid out of the city rates. We have recognised an analogous principle in London in our system of rating—that of making the richer pay for the poorer classes. As a rule, the adoption of all such unsound and uneconomical principles leads to grave errors in practice; and I am sure that it has done so in relation to the water supply for both London and Paris. The poor, as a class, are never benefited by such regulations. What severe pressure would be laid upon the poor man if he paid 4d. per 1,000 gallons (for that is really what the London companies receive for the water they supply) for all the water he used, and was relieved from a payment for that which his neighbour wastes? The quantity required for a workman's family could not be more than 25 gallons per day. People seldom care for that which is given to them; and I believe the interests of the poorer classes will be best promoted by exacting payment in some shape or other for everything they consume. We must, in order to relieve the necessities of their condition, learn to give them justice rather than charity.

I do not admit that, as a whole, the administration of the water supply in Paris is better than our own, or that there is anything in it to attract us to a centralized government. If there were, we have to consider that institutions of foreign growth may not be congenial to our own country. There can be no greater mistake than to suppose that the institutions which succeed well in one nation may be copied by another. Institutions are not made; they grow; and everything depends upon the genius of the people among whom they are attempted to be founded. In this country we may enjoy an inconvenient amount of freedom, but we have become attached to that freedom; and, with all its grievous defects, local self-government has done much for us, and become a part of our national polity. It is well not to attempt violent changes when they interfere even with the treasured prejudices or attachments of a people. We have tried government by commission in this country, but without any success in any case. We had a short-lived Commission of Sewers in Greek-street, and subsequently we had a hastily improvised Board of Health. The latter, after a few years' desperate struggle for existence, came to an untimely and inglorious end. Let us be cautious, then, in promoting the creation of dominant bodies, who are not responsible to the public whose interests they are called upon to protect. There are undoubted evils connected with large trading companies, but they will be found less than those arising from centralized authority, as they are more easily grappled with and overcome.

The next plan suggested is that of vesting the control of the water supply in the present Metropolitan Board, or in any similar Board that may arise out of the reconstruction of the local government of the metropolis. The argument to sustain such a plan is that the water supply ought to be made a matter of municipal arrangement, the rates being debited with the expenses, and credited with the receipts from the water rates. We are taken to Manchester, the Corporation of which makes a profit out of the supply of water. The public are often misled on economical questions by looking at that which is seen, and not looking into that which is unseen. In this case we see the profit, but we do not see the various items on the other side, which would fairly constitute a *per contra* account, and make it questionable whether the Manchester people are really benefited by the arrangement. There are people of weight and intelligence in that city who contend that the arrangements as to water and gas are not quite so economical as they appear. It must also be said that there are places in the empire where the same arrangements as are now carried out in Manchester have been attempted, and have signally failed. In fact, it is worthy of grave consideration, whether it is not entirely without the province of a municipal government to enter upon any trading business whatever. As a rule this is never done well, is very expensive, and is open to this grave objection, that, unlike a commercial firm or company, a municipality rarely ever knows what business so conducted by them really costs, and it is liable to abuse from favouritism and sinister influences of all kinds. The argument is very plausible that a corporation ought to have the control of water, as so much of it is wanted for public purposes; but we have to inquire whether the public service is likely to be better supplied by a corporation becoming also a water company, or in its public capacity contracting with an existing water company. All experience will, I think, support the latter view.

Be that as it may—if we have conceded the principle, how are we to apply it to London—where, with the exception of the City, we have nothing worthy of the name of municipalities? No one will look at the Metropolitan Board as a permanent institution. From the manner in which it is elected it is virtually an irresponsible body; and neither by its constitution nor its antecedents would it be recognised as a power in whose hands might be safely deposited the administration of the water supply. We have thirty-nine vestries and district boards—too many to secure efficiency and responsibility in the execution of public works. That is our first and greatest difficulty in the discussion of all public questions affecting the local government of the metropolis. What we require to put us in a fair position is an extension of the Municipal Act to the metropolis. Make every parliamentary borough into a corporation, elected in the same way, and for the same purposes as corporations in such towns as Birmingham and Bristol, with a central body for purposes of general government. If this were done, then I believe that they could more profitably contract with the water companies for the water wanted for all public purposes, than enter upon the supply of water under any centralized management; and such bodies, elected by the ratepayers, who are all of them consumers of water, would also be able to protect the interests of all classes, by seeing that the arrangements entered into for an efficient water supply are properly and fully carried out. If this were done, then I think that an Act of the Legislature, making it compulsory upon the water companies to give a constant supply, and reasonable powers to enforce prevention of waste, would be the most effectual way to the desired end. We are not talking now of what would be best in an entirely new community, where no machinery for water supply existed, but what will be the best under present circumstances, where large interests have arisen, and where a complication of arrangements exists.

I have very imperfectly glanced at the main bearings of a great question, the settlement of which cannot be much longer postponed. Such suggestions as I have made I offer most deferentially to this assembly, and to those who may afterwards read this paper. I am aware that the subject is surrounded by difficulties. Immense interests are involved, but the greatest is that which is made up of the convenience, comfort, and health of a teeming and struggling population. We have no excuse for neglect, for it can be shown as clearly as figures can demonstrate anything—that, besides its other imperfections, the present system of water supply is both extravagant and costly. Happily, the question is one that is not likely to attract a host of noisy agitators, but it is therefore the more incumbent upon the thoughtful and the prudent, those who have the power to influence public opinion, that they should take it up and press it to a successful solution; and I am glad to find that all parties are disposed to consider it in a calm and conciliatory spirit. We live in an age fruitful of professions and promises—but we must not forget the admonition that "words are the daughters of Earth, and things are the sons of Heaven." Let us hope that the present opportunities will not be permitted to pass away unimproved. It is customary, in urging upon the community the importance of a water supply, to point to the works of the ancients—to their baths, aqueducts, and fountains. We have public works of other kinds which show that we have the ability to excel, both in design and execution, the boasted achievements of antiquity in all works of practical usefulness. We have the skill, the enterprise, the wealth—then why not employ it in this direction? In my judgment we can confer no greater boon upon the present age, nor lay any prouder claim to the gratitude of posterity, than by conveying to the houses of the poor and the toil-worn what Mr. Bateman appropriately designates as an inestimable blessing—an abundant supply of pure water.

DISCUSSION.

Mr. S. C. **Homersham** said for the last twenty years he had been obliged to give his attention, either in designing or constructing works or in attending Parliamentary committees, to the question of the water supply of London in the interests of the consumers. He was glad the paper before them had been brought forward in this public manner, because it would ensure the full and free discussion for which an opportunity was always afforded by this Society. This question had hitherto been too much treated by men in authority in private, without reference to the consumer, and too often by men who knew but little of the subject. He took exception to some of the statements put forward by Mr. Beggs. With regard to the question of constant supply, all who understood this subject would agree that constant supply was the right system, and there could be no doubt that sooner or later it would be adopted in the metropolis. But there were other matters connected with water supply which were even more important than this. Mr. Beggs had stated, with regard to the quality of the water, that "injustice had been done to the London companies by the condemnation of the water supplied by them," which, in some instances, had been analysed "after leaving a cistern, and assumed to be in the state in which it left the mains." He (Mr. Homersham) could only say that the bad quality of the water supplied by some companies had been evidenced by microscopic examinations by men of science, made for him (Mr. Homersham) on water taken direct from the mains, and by the death rates. He held in his hand the return of the Registrar-General, printed in the *Times* of 22nd August last, and, in remarking upon the mortality in the several districts of London during the prevalence of cholera, he wrote as follows:—

> "We may now venture to look back and draw some deductions from the facts as they are recorded in the tables for the five weeks ending the 11th of August, during which 4,454 men, women, and children died of cholera and diarrhœa. The mortality in the five weeks has been at the rate of 37 per 1,000 living annually; but in both the South and West Districts, covered by 1,400,000 people, the mortality has scarcely exceeded the average by 1 per 1,000. . . . The dense Central Districts are, some of them, such as St. Luke's, remarkable for poverty; others, such as the City of London within the walls, for their wealth. The mortality by cholera was at the rate of 1 per 1,000 in St. Giles, 2 in the Strand, 0 in Holborn. . . . There are seven districts in the East; the mortality by cholera in the poor district of Shoreditch was at the annual rate of 4, by cholera and diarrhœa 8 in 1,000; five of its sub-districts are supplied by the New River, one partially and one wholly by the East London, probably from Lea-bridge. In the rest of the East Districts the mortality by cholera was at very different rates: it was at the rate of 39 per 1,000 in Bethnal-green, 50 in Mile-end Old Town, 60 in St. George-in-the-East, 70 in Whitechapel, including deaths in the London Hospital from other eastern districts, 70 in Poplar and Bow, and 80 in Stepney. Bethnal-green is one of the poorest districts of London, if we may judge by the annual value of the houses; but the people of Bow and Poplar are not conspicuous for poverty. The whole of these districts, where the mortality from cholera was from 30 to 40 fold higher than it was either in the west or the central, in the north or the south of London, were supplied with water from the Old Ford reservoirs. London is divided into 37 districts: six districts are supplied from Old Ford, and everyone has been ravaged by the epidemic; the other 31 districts have for six weeks in succession suffered slightly. The 37 districts are subdivided into 135 sub-districts; 21 are supplied with the same water, and have all suffered six weeks in succession; 115 sub-districts have suffered inconsiderably, except in St. Botolph and a few other districts, where the same water has crept in, and the mortality is partially swollen. By the doctrine of chances it is impossible that the coincidence between this particular water and the high mortality should be fortuitous, in 135 cases, during six weeks in succession. The induction extends over all the area of observation in previous epidemics, where sewage water has so often led to cholera outbreaks. . . . . . This great lesson should be taken to heart by every water company and every community in the kingdom. Unclean water cannot be consumed with impunity; its consumption is the sin of which cholera is the punishment."

That was only one of a dozen similar documents which had been issued during the last five or six years by men of the highest authority. Mr. Simon, the medical officer of the Board of Health, had stated in this room the prejudicial effects which were produced upon the population of one of the southern districts of London, from the supply to them of water taken from the Thames at Battersea, and it was notorious that in the districts supplied at that time by the company then referred to, cholera was very prevalent on each occasion of the visitation of that disease. Whether the supply were constant or intermittent the quality of the water was pernicious. He spoke on this question from extensive experience, not only in London and its environs, but throughout the United Kingdom. With regard to the important question, in whose hands the administration of the water suppy should rest, there was the remarkable fact before them that, with one single exception, owing to the opposition of Parliament and the Government of the day, for the last sixty years there had been no new company allowed to be formed for the supply of water to London. Mr. Beggs had said, without giving any grounds for the statement, that it would not be desirable to form a new company, and that two sets of pipes ought not to be put down in the same streets. That was another point to which he took exception. He (Mr. Homersham) submitted that if they were to have an adequate and cheap supply of pure water in London, it was indispensable that they should have competing companies, and that new companies should be allowed by Parliament to be established. The aggregate capital raised by the existing water companies was between seven and eight millions, which had risen to an artificial value of between eleven and twelve millions. Before they could change the present administration otherwise than by competition they must buy up the interests of those companies, and it was proposed, when that was done, to throw them aside as useless, and carry out a large independent scheme. The proposition put forth by Mr. Bateman, who had supplied Glasgow with water from Loch Katrine, was that they should give the old companies an income in perpetuity of £450,000 a year, that being the present net revenue of those companies. He then suggested that they should go to the Severn, and impound the water in artificial lakes, for their supply, while Mr. Hemans proposed that they should go as far as the Cumberland lakes. He thought that of the many monstrous propositions that had been put before the ratepayers these were the most monstrous. Many of the water companies had been literally poisoning the people of London; and looking at the effects produced, he did not see why those companies should be freed from fair competition, and, instead of being compensated, should not be made liable to the legal penalties which were imposed upon railway companies or injuries and deaths occasioned by want of proper precaution in the conduct of their business. He would mention an instance within his own experience, to show the value of competition in water supply Some years since the inhabitants of Plumstead, Woolwich, and Charlton, became dissatisfied with the quality of the water supplied by the Kent Water Works Company, from the source of the Ravensbourne, and they determined upon having better water from the chalk formations in their own locality. A company was able to be formed for the purpose, without applying to Parliament, and in three or four years 90 per cent. of the consumers of the locality left the old company, simply from the superior quality of the water. The success which attended this measure induced the old company to resort to the expedient of sinking similar wells, in the hope of getting back their customers, the ultimate result being that, after a competition of several years that company abandoned the Ravensbourne altogether as a source of supply, bought up the interests of the new company, and thus the district was now supplied with water free from impure organic matter. That was a practical illustration of what competition had done in the matter of the supply of pure water. As to the present London water, no doubt that above Teddington lock was better than that below it, but, at the same time, he thought the supply obtained from the water-shed of the Thames was not satisfactory. In the Queen's Speech, on the opening of the present session of Parliament, he found the following paragraph:—" Estimating as of the highest importance an adequate supply of pure and wholesome water, I have directed the issue of a commission to inquire into the best means of permanently securing such a supply for the metropolis and for the principal towns in the densely populated districts of the kingdom," but when he turned to the instructions giving to the commission, as published in the *London Gazette* of 28th December, he found them to be as follows:—After reciting the names of the commissioners, the words were—" for the purpose of ascertaining what supply of unpolluted and wholesome water can be obtained by collecting and storing water in the high grounds of England and Wales, either by the aid of natural lakes or by artificial reservoirs, at a sufficient elevation for the supply of the large towns, and to report, firstly, which of such sources are best suited for the supply of the metropolis, and its suburbs, and secondly, how the supply from the remaining sources may be most beneficially distributed among the principal towns." Now in the speech from the throne they were told that the inquiry was to be into the *best* means of obtaining a permanent supply of pure water, whereas in these instructions they found it was to be obtained from natural or artificial reservoirs. What he would say on that point was that if they took the water from any lake, natural or artificial, that lake would represent the cesspool of a large district of the country around it. It might have the quality of softness, but it would be impure and contaminated with the droppings of animals, decaying vegetable matter, the *exuviæ* of fish, and living organisms, and was altogether unfit to be brought into this or any other city for domestic purposes.

Mr. Elt would mention one or two facts in connection with the supply of water from the chalk basin of London. About twenty years ago, Mr. Webb, a soda-water manufacturer, of Islington, in order to get a supply of water suitable for his purposes, sunk a well to the chalk and obtained excellent water from it. A few years subsequent to that a similar well was sunk in the same neighbourhood for the purposes of the Pentonville Model Prison, and immediately after that was done Mr. Webb found his supply so deficient that he was obliged to sink his well ten feet deeper to get the quantity of water he wanted. A few years after that the Holloway Prison was built, and there also a well was sunk into the chalk basin; the consequence was, the well of the Pentonville Prison had to be deepened, and Mr. Webb had also to sink his well another 20 feet to get the supply he had before. There was another case he could mention. At Nicholson's Distillery, in Clerkenwell, a well was sunk into the chalk, and water obtained from it. A brewer, occupying nearly opposite premises, also sunk a similar well, and each well had such an effect upon the supply of the other that a contest was maintained for a length of time, at a cost of several thousands of pounds, to obtain the supply of water which each party required, until at length the victory was gained only by the superior pecuniary resources of the distillery. In the latter case, the wells were sunk within a short distance of each other; but in the case of Mr. Webb and the two prisons, the wells were situated a mile and a-half or two miles from each other. The New River Company, wishing for a larger supply of water, sunk a shaft close to their reservoir in the Hampstead-road, and, after going a great depth, they could only obtain a supply of 4,000 gallons per day, and at times it was so small as to be insufficient to keep the pumps in working order; the attempt was abandoned after the expenditure of many thousands of pounds. With regard to the point that the present daily supply to the metropolis of 108,000,000 gallons was at the rate of 30 gallons per day for each head of the 3,000,000 of population, he might observe that that calculation was deceptive, because putting aside waste, evaporation, and other causes of loss, a very large proportion of that water was consumed for manufacturing purposes, and a further large quantity for the supply of ships in the port of London, and in the summer large demands were also made for road watering.

With respect to where the supply should be obtained, it was not for him to say, but it would seem that at present one-half the population of the metropolis must make up their minds to be poisoned, and the other half must bring actions against the water companies for doing it.

Mr. W. Botly remarked that a good deal of valuable information had been elicited at different times in discussions that had taken place in this room, on the subject of water supply, and there had recently appeared an able pamphlet by Mr. Bailey Denton on the subject, which had been noticed in the Society's *Journal*. He (Mr. Botly) agreed generally with the views expressed in the paper, and particularly with regard to the pollution of water in cisterns. Having had considerable experience in this matter in the town of Salisbury, he could state that great mortality occurred from cholera in the lower districts, where the water was bad, and for a long time the ordinary death rates were very high, but since the water supply had been taken from the chalk, the rate of mortality had greatly diminished, and the health of the town was at present all that could be desired. For his own part he should prefer to see the administration of the water supply in the hands of the vestries, rather than in those of corporations.

Dr. Bachhoffner gathered, from what had fallen from Mr. Beggs, that the great panacea with reference to the water supply was, that it should be constant; that appeared to be the pith of his paper. However desirable a constant supply might be, it would involve great expense in adapting the present water-service of the houses to such a system; but he believed that Mr. Beggs had an admirable contrivance of his own (though he had not mentioned it) in the shape of a water-meter, by which the consumer might use as much water as he liked, and pay for no more than he used. As to the obtaining a constant supply, the fact was, they had it already, for there was an Act of Parliament in existence which provided that if three-fourths of the consumers in any district agreed to demand a constant supply, the water company was bound to give it. It was, therefore, their own fault, and not that of the companies, if they had not a constant supply.

Mr. W. B. Galloway said this was a question of such vital importance to the highest interests of humanity that it ought to be discussed irrespective of all pecuniary considerations. As to the quantity supplied, he thought 30 gallons per day per head of population was liberal enough, if it were not for the enormous waste that took place in all large cities and towns. He conceived, however, that a larger supply would be beneficial to such a city as London, and that they ought to have the purest water that could be obtained for domestic use. He suggested a special supply, with a separate arrangement of pipes for that purpose, and that the water for washing, manufacturing, and sewerage purposes should be furnished through the present ordinary channels. Instead of going 200 miles away for water, he would utilise the natural ebb and flow of the Thames by means of reservoirs placed at such an elevation as would give sufficient pressure to be at once available in the extinction of fires, instead of having to wait for the arrival of the engines. He did not think there would be any necessity to break up the streets to provide the second set of pipes which he suggested, but he thought they might be placed above ground. They ought to value the public health above all commercial and pecuniary considerations; and such questions as these should be discussed on the principles of equity, and having regard to the highest interests of humanity.

Mr. Baldwin Latham thought there were some points in the paper which might lead to misconception on the subject of constant supply in respect of the places where that system already existed. It had been stated that in Norwich, under the constant supply system, the consumption had been reduced from 40 gallons per head per day to 12 or 15 gallons. At the period during which the consumption was 40 gallons per head, it proved to be a ruinous affair for the company; but when an engineer took the matter in hand, and adopted special fittings to prevent waste, and when the consumption was reduced from 40 gallons to 15, the company was brought from a state of insolvency into one of profit. It should, however, be stated that in Norwich, out of a total of 15,000 houses, only 3,000 were provided with water-closets; and at Wolverhampton and other places where there was a constant supply the consumption of water was at a comparatively low rate from the same circumstance. In the case of London, in the event of a constant water supply being afforded, it was to be presumed that each house would have its water-closet, and consequently a large amount would be required for such purposes. He might state that in the 120 towns where he had examined the water supply, the average supply was 25 gallons per head per diem, and where any great falling off in consumption was noticed, it was in those towns which did not possess an adequate system of drainage. With regard to the regulation of the supply by meter, it would on the face of it appear a fair proposition on the part of a company, provided they could in this way realise the fourpence per thousand feet from the consumer. But the quantity of water required by the lower classes was larger than that which was used by the upper classes, and, therefore, if the former were made to pay the same for their water as the latter, they would be compelled to economise their consumption, a most undesirable result. He thought, on the whole, the system of supplying water by rental was a fair and equitable one to all classes. As to the fittings required when a constant supply was given, he believed in the case of London that no difficulty would arise in this respect. They were not now discussing the sources of supply, but in most of the towns in the country where works had been carried out, extensive arrangements had been made for the storage of water; but here they had a large river like the Thames going through London, and thousands of acres along its banks were now under water, and that which would be valuable for storage was allowed to run away to waste. If that could be made available, a better supply might be secured, and the companies could give a constant supply at a not unreasonable cost. With regard to the internal fittings in houses, they found in most cases the water supply for domestic purposes was from cisterns, which also supplied the water-closets, and too often became contaminated with the foul gases there formed. He believed the only remedy for this was the separation of the water used in the closets from that which was employed for domestic purposes.

Admiral Sir F. Nicholson said, allusion had been to the Thames by two speakers. He had some acquaintance with that river, and with what was done with regard to purifying it; large powers had been granted, by the Act of last session, to enable those who had charge of the Thames to keep all sewage from entering it. The Metropolitan Board exercised "conservancy" in that respect over the portion extending from Putney to the Lower Reaches, where the sewage was carried out to sea; and it was hoped that in the present session similar powers would be conferred with regard to the portion between Putney and Staines; so that in a short time the whole of the sewage would be kept out of the Thames, as soon as the towns and villages on its banks were able to make such arrangements as would obviate the discharge of any sewage whatever into the stream.

The Chairman said that was to be in three years.

Admiral Sir F. Nicholson added, that whatever the period might be, if they kept the sewage out of the Thames, and prevented the enormous waste of water from the flooding of the land; and if they stored that water, they would be able to give a large additional supply to the metropolis without going to Wales or Cumberland for it.

Dr. Whitmore merely rose to answer an observation that fell from Mr. Homersham with regard to the supposed impurities of the Thames water. It formed part of his professional duty, as a medical officer of health, to analyse the water supplied by two Thames companies, the West Middlesex and the Grand Junction, and he could say for the last twelve months the water supplied by those companies was in an exceedingly pure condition. On the average the West Middlesex Company did not contain more than half a grain of organic matter in a gallon; and that was also about the condition of the water of the Grand Junction Company. On the other hand, the water derived from the surface wells of the metropolis, and which the inhabitants of London had been accustomed to drink and to speak of as fresh, sparkling spring water, was most impure. In Marylebone there were as many as 25 or 30 of those wells which had been lately supplying the inhabitants with water for drinking, and he had always found from three to six grains of organic matter per gallon in that water. The condition of that water was such that, during the visitation of cholera, he thought it his duty to request the local authorities to close the pumps. Looking to the fact that a large number of towns on the Thames still discharged the sewage into the river, it was a remarkable thing that the companies' water was brought to them in such pure condition as it was; this was the result of the admirable system of filtration adopted. It was, therefore, an injustice to those companies to say they were still supplying the public with poisonous water. For his own part, he thought an intermittent supply was better than a constant one; for this reason, that if they had a constant supply it was necessarily allowed to come in very small quantities. They could draw, probably, from the present supply as much in one minute as they would be able to draw in half-an-hour with a constant supply. Moreover, the change of system would involve the alteration of the whole of the fittings in a house, as the present taps would be blown off by the high pressure required. It would, therefore, involve considerable expense to every householder. With regard to the amount to be supplied, the limit had been fixed at 12 to 15 gallons per head per day, but that was making but small allowance for the discharge of water down the drains and closets, which tended to remove fever and other epidemics from our dwellings. There was no cause for apprehension as to the failure of the present sources of supply. Taking the case of the Thames for the last two or three years, there had been flowing over Teddington Lock an average of 500,000,000 gallons of water in the 24 hours, while we were only taking about 80,000,000 gallons daily above that lock.

Mr. Cooper, as a medical officer of a poor district of the metropolis, was in favour of a constant water supply. The more water they had the better it was for the population in all respects. With regard to the high pressure spoken of in connection with the constant supply system, he apprehended it could be so regulated as to be deprived of all danger even in conveying the water to the top stories of the houses, a system which, in the case of houses let in lodgings, he particularly desired to see carried out, as greatly conducing to habits of cleanliness.

The Chairman said it had seldom been his lot to hear a more able paper on any subject than that which had been brought before them this evening. Some of the positions were irrefragable, and others were sustained by able arguments, though he could not say he agreed with all of them. It was a wonderful fact that for nearly a quarter of a century the insufficiency of the water supply had been fully acknowledged, and yet not fully remedied. It was almost impossible in this country to get anything done unless the people themselves put their shoulders to the wheel and forced it upon the legislature. The House of Commons invariably waited for the expression of the opinion of the people; it did not attempt to go before them, still less did it attempt to impose the weight of its influence upon them. It therefore remained with the people to force this question of water supply upon the attention of the legislature. We had had severe lessons of late as to the necessity for an adequate water supply in the metropolis, in the recent visitations of cholera, typhus, diarrhœa, and other malignant forms of disease, the results of which were more deadly to the population than the battle-field was to those engaged in a campaign. Mr. Beggs, he thought, seemed rather to slight the amount of the death-rate which proceeded from an insufficient supply of water: he argued that it resulted from various causes. Doubtless it did, bad air was unhealthy, and bad food was unhealthy; but still he believed, of all causes of sickness, that which proceeded from an insufficient supply or bad quality of water was the worst. In that respect he agreed with Mr. Homersham. It was proved by the returns of the Registrar-General in the visitation of cholera last year that wherever the polluted water from the Old Ford went, there cholera went with it. At North Shields, in a part of the town where polluted water was supplied, there cholera appeared; in other parts of the same town where the water was of good quality it was unknown. Did not that prove that cholera and diarrhœa went with bad water? Mr. Beggs had alluded to the question as affecting the poor. That, he thought, was a most important subject. If, from the circumstances by which they were surrounded, they were accustomed to uncleanly habits, they gradually deteriorated in their moral condition, and sank in the scale of humanity, should we not exert ourselves by all possible means to prevent such a result as that? To take a low view of the case. Let them consider the amount of sickness that was thus generated, by which the poor rates were increased, and so the rich were made to pay. He could not agree with Mr. Beggs that the rich should not in these matters pay for the poor, but that all classes should pay equally. The Legislature, in a matter not so important—that of the income-tax—agreed to the principle that the rich should pay, and that the poor should escape; and why should not this be applied in the case under consideration? One speaker had referred to the bad effects of water entering the cistern from the roofs of the houses. No doubt such water became largely impregnated with poisonous gases, which it absorbed from the impure atmosphere of towns. The subject of constant water supply to the metropolis had been urged on the Legislature since the year 1850, not only by theorists, but by the irresistible logic of facts. In the matter of the preservation of property from fire, the question of constant supply was one of great importance. This has been especially evidenced at Wolverhampton and Paisley, where it appeared that there was always a supply of water at high pressure, rendering it almost impossible that serious fires should take place. When they took into consideration the fact that the average time for a fire-engine to arrive at the scene of a fire was half an hour, and that in the towns he referred to premises when on fire had been flooded with water in five minutes, the great importance of a constant supply in London, with all its vast amount of property, would be at once apparent. As to the sufficiency of the present supply, it must be borne in mind that what was sufficient some years ago was not sufficient now. The increase of population was considerable, and gradually cleanly habits had increased, so that persons who used little water formerly, required now a larger supply. Thus the water supply of all towns became more and more insufficient. Glasgow in 1838, was supplied with 26 gallons per head per day; in 1845, it rose to 30 gallons, and that was insufficient; in 1852, it was increased to 38 gallons, and at the present time 45 gallons per head was complained of as insufficient. With regard to the purity of the water he ventured to differ from the medical gentleman who had spoken on that subject, though, as he was an authority in the matter, he would not press his opinion. With regard to the rates charged for water, he considered the water companies placed them too high, particularly when it was considered, as Mr. Beggs stated, that they were only water-carriers. The gross annual receipts of the several water companies in London amounted to £700,000, and they paid in dividends £400,000 a year. The rateable value of the metropolis being fifteen millions, that income represented one shilling in the pound. That was surely too much to pay for water supply. Mr. Bateman proposed to bring the water from the Plinlimmon hills, free from all impurities, and deliver it at the houses at three pence in the £ only. Mr. Homersham rather found fault with Mr. Bateman's proposition to buy up the old water companies and pay them the £400,000 which they now received in dividends; but that sum would include the purchase of such mains and works as would be required under the new system which Mr. Bateman proposed. He (the Chairman) was sure it would be the unanimous feeling of the meeting that their best thanks were due to Mr. Beggs for the exceedingly able paper he had brought before them.

The vote of thanks having been passed.

Mr. Beggs having expressed his gratification at the cordial manner in which the proposition had been received, said he had one other acknowledgment to make, and that was to Dr. Bachhoffner, for the way in which he had advertised a portion of his business; the kindness was all the greater because it was unsolicited. He would, however, correct Dr. Bachhoffner's impression that he (Mr. Beggs) was the inventor of a water meter; he was only the seller. On the other hand, he had said nothing about the application of meters to domestic water service; and he believed no inventor had found one which was so applicable; therefore, as they were only suitable for large manufacturing establishments, he thought, if he had entertained any considerations of a commercial nature, he had not advanced them in any way in the paper he had had the pleasure of bringing before them.

Proceedings of Institutions.

Bacup Mechanics' Institution.—The report presented at the twenty-eighth annual *soireé*, held on Wednesday, January 2nd, says that the various departments of the Institution have been maintained in a high state of efficiency. The number of members for the separate quarters has varied as follows:—1st, 304; 2nd, 265; 3rd, 160; 4th, 373; the average number for the whole year being rather less than for the preceding year, which was the highest on the records of the Institution. Two hundred and twenty volumes have been added to the library during the year, and 4,410 volumes issued. The directors express their acknowledgments to David Morris, Esq., of Manchester, who kindly gave his services for an evening's entertainment for the benefit of the library fund, and also a handsome donation for the same purpose. In consequence of direct telegraphic communication between Manchester and Bacup having been recently completed, arrangements have been made for the daily supply of two reports of the Liverpool Cotton Market, and also for reports of the Liverpool and Wakefield Corn Markets. The attendance at the classes, both male and female, has been most gratifying, the scholars averaging 95 per night, and in the various examinations the students have taken a fair proportien of prizes and certificates. The day school register now shows a larger attendance of scholars than for several years past, the average being 165. The treasurer's account shows that the receipts have been £524 11s. 1d., and that there is a small balance in hand.

TAXATION OF INSTITUTIONS.

It appears from the *Birmingham Daily Gazette* that a deputation, consisting of the Mayor of Birmingham (Mr. G. Dixon), Aldermen Hawkes and Ryland, of Birmingham; Mr. Councillor Price and the Borough Treasurer of Leeds, had an interview with the Chancellor of the Exchequer, a few days since, on the subject of the assessment of public buildings to the inhabited house duty.

The deputation was introduced by Mr. Scholefield, M.P., who stated that, in consequence of the shortness of the notice, deputations from several other towns were unable to attend.

The Mayor stated that the object of the deputation was to obtain relief from the taxation of public buildings to the inhabited house duty.

Aldermen Hawkes and Ryland pointed out that till within the last two years the Town Hall, the Midland Institute, and other public buildings in Birmingham were not assessed to the inhabited house duty. At that time the Free Library was not built, but at the present time the Town Hall was assessed at a rental of £1,500 a-year, and the Midland Institute at £1,000, so that in the case of the Town Hall the tax, added to the curator's salary, far exceeded the whole sum received for the use of the hall. The authorities at Birmingham had appealed against the tax, but the Board of Inland Revenue had decided against them, on the authority of a case decided by two of the judges in reference to Wolverhampton some years ago, which decision seemed to provide that if a building was used as a residence for any person it was liable to the house tax. The deputation urged that Parliament could never have intended that a building like the Town Hall, in which only two or three rooms were occupied by a person in charge of the same, should be liable to the duty, and asked the Chancellor if he would introduce a short Bill to exempt such buildings in future. If this were done, the deputation said they should still continue to allow the curator to reside on the premises, but if that request were not acceded to they were prepared to take a house in the neighbourhood, and thus claim exemption. Another alternative suggested by the deputation was that only that part of the building used for residence should be taxed.

The Chancellor of the Exchequer appeared to assent to the reasonableness of the request of the deputation, and requested that the suggestions should be put in the shape of a memorial to the Lords of the Treasury so that he might bring the matter formally before the Government.

The members of the deputation are anxious, as far as possible, to enlist the co-operation of the managers of Institutions in all parts of the country in obtaining the desired exemption.

Manufactures.

Prizes of £800 for Machines for cutting Coal.—It appears by the *Mining Journal* that with a view to encourage the development of coal-cutting by machinery, the Association of the Colliery Proprietors of South Lancashire and Cheshire have decided to offer three prizes to the inventors of the best machines for the purpose. The machines submitted for competition are to be supplied not later than Nov. 1, and they will then be practically tested in the collieries before a committee appointed by the association for that purpose. The committee will by this means ascertain which machines are most suitable to the requirements of the trade, and prizes of £500, £200, and £100 respectively will be awarded to the three best. That the existence of a practically useful machine will place the coal-owners in such a position that they will be less at the mercy of their workmen is beyond question; but it does not by any means follow that the introduction of machinery will be injurious to the workman, unless he himself makes it so. The value of such a certificate as the winning of even the lowest of the three prizes would be, as to the merit of a machine, beyond estimation, the association being composed exclusively of gentlemen whose reputation for integrity and honour is universal, and whose practical knowledge is acquired from their habitual occupation being the actual management of the collieries in which they are interested.

Colonies.

AUSTRALIA EXPORTING WOOL TO AMERICA.— The *Melbourne Argus* says an experiment of an interesting nature is about to be tried with one of the staple exports of this colony. Hitherto all the wool exported from Australia has been sent to London or Liverpool, almost exclusively to the former port. It appears, however, that American buyers are not unfrequent at the London sales, and to test the United States market a fine ship has been placed on the berth for New York direct, carrying wool. The result will be looked forward to with considerable interest. It is very rarely that a vessel sails from this port direct to any of the cities of the east coast of America. This is only the second ship which we can call to mind as having been placed on the New York line during some years past. If it finds a good market a new trade may be opened up.

BOOTMAKING IN AUSTRALIA.—It appears by a Melbourne paper that the manufacture of boots and shoes on an extensive scale has only recently commenced in the colony, but the strides have been very rapid, and establishments are at present in operation which do business wholesale. At the Intercolonial Exhibition the Collingwood Boot Factory shows a case of boots, all of which were closed and footed by apprentices who have served about 2½ years of their indentures; and all the leather used was tanned at their factory, which is situated in Collingwood Flat. It is, in fact, a tannery and boot factory combined. The hides are received, tanned, and curried to the extent of two or three hundred weekly, the greater portion of which is worked up into boots and shoes. The soles are pegged and not stitched, and the system of division of labour is thoroughly carried out. The number of men and boys on the establishment, engaged in tanning, &c., and making boots and shoes, is about 200, and a vast amount of work is annually turned out, which is distributed throughout the colonies.

Notes.

SOUTHERN COUNTIES ASSOCIATION.— The monthly meeting of the Council was held at the Society of Arts on Tuesday, February 12th., Viscount Eversley in the chair. There were present Mr. Benyon, M.P., Mr. W. B. Simonds, M.P., the Hon. and Rev. S. Best, Colonel Lennard, Rev. J. Goring, Mr. Lyall, Colonel Deedes, Rev. J. S. Clutterbuck, Mr. Clutton, Mr. Rigden, Mr. Turner, Mr. Punnett, Rev. J. Beck, and Mr. Shute (Secretary). Reports were presented by Mr. Rigden from the Agricultural, and by the Hon. and Rev. S. Best from the Arts Department. Both committees were empowered to carry out their recommendations. The offer of the Pavilion for the Loan and Arts Exhibition was accepted, as well as that of the Sussex Horticultural Society to hold their flower show at the same time, and in connection with the exhibition. The Council was adjourned to March 12th.

DWELLINGS FOR THE WORKING CLASSES.—A deputation from the Metropolitan Building Society waited on the Earl of Derby on Saturday, the 9th inst., with the object of obtaining a loan of £500,000 for the building of extensive ranges of workmen's houses in the metropolis. The prospectus of the company, which had been previously sent to Lord Derby, states that the want of workmen's houses was so great and pressing that it would require at least £500,000 per annum to be expended for the next five years to mitigate the evil in any sensible degree. That outlay would supply house accommodation for 100,000 persons. Mr. A. Alison, the chairman of the company, explained the object of the deputation. The society which the deputation represented asked the Government to guarantee their debentures bearing 4 per cent. interest for seven years, to the extent of three-fourths of the expense of the buildings, in security of which they would give a mortgage on the property. Lord Derby called the attention of the deputation to the Workmen's Houses Act of May, 1866, under which any company might obtain loans, to the extent of one-half the cost of the buildings, at 4 per cent. interest. Mr. Alison stated that that act was passed when the interest of money was 10 per cent., and then it offered great inducements to the public to act upon it by obtaining money at 4 per cent.; but now it offered no inducements, as the interest of money is 3 per cent., and loans to the extent of one-half could now readily be obtained from private sources. He (Mr. Alison) thought the plan he had suggested of issuing debentures with the Government guarantee was much better for the Government, as it would involve them in no outlay of money. Lord Derby said that although the act of last year had not yet been acted on, he fully expected that it would. Should, however, the act remain inoperative, the question of amending it might then be considered; in the meantime he was not prepared to advise Parliament on the subject.

Correspondence.

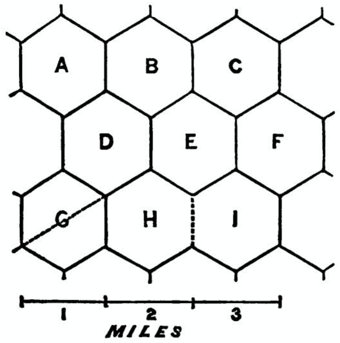
CAB FARES.—SIR,—Within the last ten years I have employed thousands of cabs. I never ask a cabman what his fare is, and I never have any disputes on paying them—because I find the following method an almost infallible criterion of the distance I travel. A "four-wheeler," as a rule, goes about eight miles an hour, and a "hansom" almost exactly nine miles an hour. In other words, a "four-wheeler" goes a mile in 7½ minutes, and a "hansom" goes a mile in 6¾ minutes. I give the cabman the benefit of the fractions, and pay a "four-wheeler" sixpence for every seven minutes he drives me, and a "hansom" sixpence for every six minutes he drives me; I thus pay the "four-wheeler" about sixpence halfpenny a mile, and the "hansom" about sevenpence a mile, and the payment is almost always received with thankfulness. From long experience I know the distance to most parts of London; but if I go any new route my method of calculating the distance always stands me in good stead. It appears to me that if strangers, or those unused to London distances, adopted this method no cab extortion could take place. To simplify matters, both styles of cabs might be paid at the same rate, viz., one penny for each minute travelled. Thus, for a journey occupying twelve minutes, the fare is one shilling; if the time occupied be any time between twelve and eighteen minutes the fare is one shilling and sixpence. By this method the cabman (unless he be a "hansom" going express, as to catch a train) is always liberally paid.—GEORGE WYLD, M.D.

15th February 1867.

THE CAB QUESTION.—SIR,—Not having taken part in the late discussion on cab fares, I could not say a word about cab-strings. To the great inconvenience of their fares, cabmen have generally given up holding the check-string, and some have no check-string at all. I can see no regulations as to check-strings in the police book, but I remember hearing from an old stager, many years ago, that a cabman who did not hold a check-string forfeited his fare.—I am, &c., HYDE CLARKE.

32, St. George's-square, S.W.

THE "COURSE" SYSTEM APPLIED TO LONDON CABS.—SIR,—If the "course" system is to be adopted for London cabs, in justice to the drivers it would hardly be fair to map the metropolis in miles square, for by that means it would be possible, taking the spaces diagonally, to deprive the driver of thirty per cent., and certain districts would be less favoured, as lying upon the horizontal and perpendicular lines. The inter-communication between north and south, and east and west, might be greatly retarded, whilst the north-west and south-east, and south-west and north-east would in that case be advanced, that is if the lines were drawn from the four points of the compass. To equalise this I would honey-comb the map, giving lines alike in favour of all districts. By this plan the driver might, once perhaps in fifty times, be enabled to charge a "course" for three-fourths of the first mile, and even, perhaps, as often to get three "courses" within a one-mile drive, but these occasions would fall within the fair law of chances, and favour no point of the compass; and, as a compensation, the intersecting points would give the overplus to the rider. I enclose a plan. The dotted line in G shows where the mile would be slightly elongated in favour of the rider; between H and I, I have marked where the cab-driver would gain; the balance of favour (under a mile) is with the cabman, which, with the present fares, is upon the right side.—I am, &c., JOHN LEIGHTON.



MEETINGS FOR THE ENSUING WEEK.

MON......R. Geographical, 8½. 1. Mr. W. Chandless, "Explorations of the Purus and Aquiry in the Amazon's Basin." 2. Don Antonio Raimondy, "On the Rivers of Caravaya, South Peru."
British Architects, 8.
Actuaries, 7. Mr. Samuel Brown, "On the Mortality in the United States of America, as deduced from the last Census."
R. United Service Inst., 8½. Mr. James Reddie, "On Manning the Navy."
TUES ...Medical and Chirurgical, 8½.
Civil Engineers, 8. 1. "Description of the Clifton Suspension Bridge;" and, time permitting (2), Captain H. W. Tyler, "On the Working of Steep Gradients and Sharp Curves on Railways."
Ethnological, 8. 1. Mr. H. H. Howorth, "On the Archæology of Bronze, in connection with Ethnology." 2. Hon. Geo. Campbell, "On the Non-Hindu Tribes of the Borders of Hindustan."
Royal Inst., 3. Prof. Tyndall, "On Vibratory Motion and Sound."
WED ...Society of Arts, 8. Mr. Edwin Chadwick, C.B., "On the Economy of Telegraphy as part of a Public System of Postal Communication."
Archæological Assoc., 8½.
THUR ...Royal, 8½.
Antiquaries, 8½.
Royal Inst., 3. Prof. Tyndall, "On Vibratory Motion and Sound."
London Inst., 7. Prof. Wanklyn, "On the Chemistry of the Noble Metals."
Zoological, 8½.
Philosophical Club, 6.
Mathematical, 8.
FRI ......Royal Inst., 8. Capt. V. D. Majendie, "On Breech-loading Small Arms."
SAT ......R. Inst., 3. Mr. G. A. Macfarren, "On Harmony."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb. *Delivered on* 12*th October*, 1866.
428. East India Communications—Report and Evidence.

Delivered on 19*th October*, 1866.
140. (I.) Great Yarmouth Election—Index to Minutes of Evidence.
210. (I.) Lancaster Borough Election—Index to Minutes of Evidence.
422. (A. IV.) Poor Rates and Pauperism—Return (A).
477. Bermuda (Yellow Fever)—Return.
525. Vessels not Armour-plated—Return.
526. Iron-plated Ships and Batteries—Return.
528. Cattle, &c. (Live Stock)—Return.

Delivered on 26*th October*, 1866.
64. (II.) Sheriff Courts (Scotland)—Second Supplementary Return, 1862 and 1863.
429. Joint Stock Companies—Return.
452. Metropolitan Local Government, &c.—2nd Report and Evidence.
529. Bombay Sanitary Commission—Report.

Delivered on 27*th October*, 1866.
458. Health of the Navy—Statistical Report.

Delivered on 30*th October*, 1866.
68. (IX.) Trade and Navigation Accounts (30th September, 1866).
308. (I.) Royal Hibernian Military School—Supplementary Return.

Delivered on 2*nd November*, 1866.
475. Public Accounts—Report.

Delivered on 9*th November*, 1866.
427. (I.) Trade in Animals—Index to Report.
462. East India (Accounts)—Return (Mr. Forster's Report).
471. East India (Telegraphic Department)—Return.
515. Medical Officers (Army and Navy)—Return (Report and Evidence, and War Office and Admiralty Letters, &c.).

Delivered on 12*th November*, 1866.
452. Metropolitan Local Government, &c.—Second Report, &c., corrected pages.

Delivered on 16*th November*, 1866.
442. Mortality of Troops (China)—Report and Evidence.
422. (A. V.) Poor Rates and Pauperism—Return (A).
495. Poor Law Union (Valuation Lists)—Return.

Delivered on 22*nd November*, 1866.
486. Gas Companies—Return.

Delivered on 1*st December*, 1866.
68. (X.) Trade and Navigation Accounts (31st October, 1866).
201. (I.) Maidstone Election—Index.
211. (I.) Rye Election—Index.

Delivered on 12*th December*, 1866.
Colonial Possessions—Part II. North American Colonies; African Settlements and St. Helena; Australian Colonies and New Zealand; Eastern Colonies; and the Mediterranean Possessions, &c.

Delivered on 13*th December*, 1866.
New Zealand—Further Papers (August, 1866).

Delivered on 14*th December*, 1866.
255. (I.) Hereford City Election—Index to Minutes of Evidence.
428. (I.) East India Communications—Index to Report of Select Committee.
504. Jamaica—Correspondence on the conduct of Naval Officers.
519. Sick Cases (Metropolitan Districts)—Return.

Delivered on 18*th December*, 1866.
483. Railways—Returns.
522. Births (Metropolitan Workhouses)—Return.

SESSION, 1865.
442. (E.) Poor Rates and Pauperism—Return (E).

Delivered on 22*nd December*, 1866.
251. (I.) East India (Military Finance, &c.), Part II.
Trade and Navigation—Annual Statement (1865).

Delivered on 24*th December*, 1866.
333. (I.) Cheltenham Election—Index to Minutes.
384. Woods, Forests, and Land Revenues—Forty-fourth Report, &c.
442. (A. VI.) Poor Rates and Pauperism—Return (A).

Delivered on 29*th December*, 1866.
Crops—Returns relating to Acreage, &c.

Delivered on 1*st January*, 1867.
68. (XI.) Trade and Navigation Accounts (30th November, 1866).
335. County Electoral Statistics, and Occupiers and Owners of Property in Counties—Returns, corrected copy.
442. (B.) Poor Rates and Pauperism—Return (B.).

Delivered on 9*th January*, 1867.
247. (I.) Bridgwater Election—Index to Minutes.
452. (I.) Metropolitan Local Government—Index to Second Report.
476. Colonial Bishoprics—Return.
491. Newspapers—Return.

Delivered on 30*th January*, 1867.
223. (I.) Northallerton Election—Index to Minutes.
243. (I.) Huddersfield Election—Index to Minutes.
274. (I.) Galway Town Election—Index to Minutes.
442. (A. VII.) Poor Rates and Pauperism—Return (A).
494. Electoral Returns (1866)—Return in continuation of the General Returns.

Delivered on 6*th February*, 1867.
Inland Revenue—Tenth Report of Commissioners.
Electoral Returns—Summary: Counties, England and Wales.

SESSION 1866.
442. (I.) Mortality of Troops (China)—Index to Report.
523. Strand Union—Letter.
532. Local Government Act (1858)—Eighth Annual Report.
The Queen's Speech.

Delivered on 7th February, 1867.

Session 1866.

474. Workhouses (Metropolitan Districts)—Statement.

Delivered on 8th February, 1867.

1. Bills—Finsbury Estate.
3. „ Joint Stock Companies (Voting Papers).

Coal—Reports by Her Majesty's Secretaries of Embassy and Legation.
Manufactures, Commerce, &c.—Reports by Her Majesty's Secretaries of Embassy and Legation (No. 1).
Madagascar—Treaty of Peace, &c.
Japan (No. 1)—Correspondence.
The Danube—Public Act relating to the Navigation.
Moldavia and Wallachia—Papers.

Session 1866.

505. Boats (Dockyards)—Return.
516. Workhouses (Metropolis)—Returns.

Delivered on 9th February, 1867.

2. Bills—Annuity Tax Abolition (Edinburgh, Parish of Canongate).
6. „ Transubstantiation, &c., Declaration Abolition.
7. „ Offices and Oaths.

Session 1866.

521. Whitechapel Union—Correspondence.

Delivered on 11th February, 1867.

8. Railway Bills, &c.—Report.
17. Medical Relief, Dispensaries (Ireland)—Report of John Lambert, Esq.
19. General Committee of Elections—Mr. Speaker's Warrant.

Colombia—Treaty of Friendship, Commerce, and Navigation.
Army (Recruiting)—Report of Commissioners.
Private Bills—Statement of Proceedings.

Delivered on 12th February, 1867.

5. Bills—Shipping Local Dues.
9. „ Metropolitan Poor.
11. „ Libel.
15. Highland Schools (Scotland)—Return.

Poor Relief (Scotland)—Twenty-first Annual Report.

Session 1866.

411. Local Taxation Returns—Return.
433. Pilotage—Abstract of Returns.
508. Taxes—Return.

Lords' Address.

Delivered on 13th February, 1867.

2. Companies—Return.
20. Charitable Funds—Return.

Crete—Correspondence respecting the Disturbances.
British North American Provinces—Correspondence respecting the proposed Union.

Delivered on 14th February, 1867.

4. Bills—Railway Companies Arrangements.
8. „ Criminal Law.
10. „ Dublin University Professorships.
16. „ Tests Abolition (Oxford).
17. „ Industrial Schools (Ireland).
19. „ Land Tenure (Ireland).
9. Post Office—Contract.
10. Small Arms—Account.
14. Police (Counties and Boroughs)—Reports.
16. Mint—Account.

British Shipping—Correspondence respecting the Operation of French Navigation Laws.
The *Tornado*—Correspondence.

Session 1865.

486. East India (European Forces)—Return.

Delivered on 15th February, 1867.

13. Bills—Church Rates Abolition.
14. „ Artizans and Labourers' Dwellings.
18. „ Trades' Unions.
3. Mails (West Indies)—Return.
40. Civil Services—Supplementary Estimate (Class IV., Vote 12).
41. Civil Services—Supplementary Estimate (Class VII., Vote 16).
42. Civil Services—Supplementary Estimate.

Patents.

From Commissioners of Patents' Journal, February 15th.

Grants of Provisional Protection.

Burglar-proof safes—176—J. Pinney.
Cards, distributing—239—W. W. Pocock.
Casks, &c., metallic hoops for—223—J. Poole.
Casks, taking off liquids from—3440—T. W. Plum.
Chlorine—134—W. Weldon.
Coverings for protection from weather—132—C. B. Marsden.
Crinoline skirts—168—C. Coleman.
Double-hooked fish-hooks—150—W. E. Gedge.
Driving belts—3426—W. Wilby.
Fermented liquors, fining—130—D. W. Hamper.
Fibrous materials, roving—219—G. Haseltine.
Fire-arms—3442—A. Henry.
Fire-arms—182—J. H. Johnson.
Fire places—3170—H. A. Dufrené.
Gas—164—J. Patison.
Gas—231—J. Greenshields.
Grain, separating—142—A. B. Childs.
Hides, &c., tanning—148—G. L. Loversidge.
Hops, pocketing, &c.—57—R. Winder.
Horse-shoe cushions—154—J. Edwards.
Horse-shoes, substitutes for roughing—225—C. D. Abel.
Hydrocarbon liquids, treating—64—L. Hand.
Iron channels, &c.—205—S. Carey.
Iron upon iron, &c., welding—128—B. Lietar.
Lenses—174—T. Ross.
Liquid matters, raising—2675—T. Woodward.
Locomotive engines—146—E. Slaughter.
Matches—126—A. Berens.
Metallic bolts—221—E. H. Waldenstrom and I. G. Bass.
Metal pipes—209—M. H. Lishman and E. Chambers.
Mines, saving life in—40—C. J. Pownall.
Mines, ventilating—235—J. Hopkinson.
Motive power—42—J. V. y Jové.
Paraffin, hardening, &c.—152—J. Rowley.
Portable steam engines—162—W. Exall.
Railway signals—29—C. I'Anson and A. Kitching.
Railway signals—140—J. Grant and J. Herbert.
Residual matters, treating—211—J. J. Lundy.
Ships—178—F. Palmer.
Ships' anchors—157—T. M. Gladstone.
Ships, &c., defence of—193—T. Berney.
Skins, treating—172—H. A. Bonneville.
Smoke, consuming, &c.—158—W. A. Martin.
Snow, &c., removing—92—C. J. Pownall.
Soap—241—C. E. Brooman.
Sound from lecturers to the audience, conveying—160—F. C. Rein.
Stations and railway trains in motion, and passengers, guards, and engine-driver, communication between—3201—H. F. Swears.
Steam boilers—3404—T. and T. F. Walker.
Steam boilers—166—W. E. Newton.
Steam boilers—243—W. E. Newton.
Steam generators—138—A. V. Newton.
Tablets, &c.—160—G. Mansell.
Type, distributing—3396—A. Mackie.
Umbrellas—136—J. Robertson.
Velvets, looms for making—215—E. Bellard.
Volute springs—217—G. Haseltine.
Watch cases—144—T. W. Willin.
Water wells—233—A. Donnet.
Wearing apparel—3324—G. Speight.
Weaving, looms for—170—S. and G. Cook.
Weaving, looms for—237—P. Jack, jun., and A. Coulthurst.
Yarns, winding, &c.—245—H. Craven and J. Speeding.

Inventions with Complete Specifications Filed.

Bench vices—341—J. S. Hoar.
Heavy bodies, raising, &c.—389—E. H. Bernier.
Rain-water, collecting and storing—359—A. Ormsby.
Raw hides, preparing—394—W. H. Towers.
Ships, propelling—362—J. H. Johnson.

Patents Sealed.

2091. E. W. de Rusett & R. F. Dale.
2115. A. Paraf.
2128. S. Mortimer.
2129. J. S. Blockey & J. Hervey.
2140. J. Murphy.
2141. H. B. Wright.
2152. H. R. Minns.
2176. H. Wren and J. Hopkinson.
2168. W. Welch.
2190. G. T. Bousfield.
2214. G. H. Bovill.
2313. J. Silvester.
2647. W. Clark.
2811. L. Daggett.
2868. P. Kerr.
2951. G. Perry.
2974. J. P. Brown.

From Commissioners of Patents' Journal, February 19th.

Patents Sealed.

2133. W. Weldon.
2143. J. C. R. Isherwood and R. Warry.
2147. J. S. Nibbs.
2149. J. Longbottom.
2155. W. Tongue.
2156. G. Haseltine.
2157. G. Carter.
2159. S. A. Main.
2160. J. Livesey and J. Edwards.
2163. W. Harrison.
2174. J. B. Fell.
2179. P. A. de Berenger.
2183. J. G. Jennings.
2199. C. T. Porter.
2217. R. H. Hudson.
2219. J. H. Johnson.
2229. J. G. Tongue.
2303. A. Mackie.
2327. W. J. Curtis.
2425. W. Clark.
2608. W. Dudgeon.
2676. R. Napier.
3315. G. Nimmo.
3329. A. V. Newton.

Patents on which the Stamp Duty of £50 has been Paid.

369. J. Henderson, S. C. Child, and W. L. Duncan.
389. G. Bohn.
399. F. C. P. Hoffman.
413. R. Hornsby, J. Bonnall, and W. Astbury.
420. R. C., R. J., & J. E. Ransome.
538. E. Hall.
407. H. A. Jowett.
398. W. Clark.
433. T. Jackson.
439. E. E. Allen.

Patents on which the Stamp Duty of £100 has been Paid.

386. J. Green.
399. W. Leatham.
406. M. J. Haines.
419. J. G. Jennings.
420. E. Caplen.